

REMARKS

The various issues raised in the Official Action are discussed in the order in which they appear in the Official Action.

In paragraph 1, on page 2 of the Official Action, English language translations were requested for Japanese Patent Publication Nos. 54-10825 and 61-284301. These publications are discussed on page 3 of the specification. In the English language Abstracts submitted via facsimile on October 2, 2001, it is noted that the subject matter of the Abstracts differs from the description set forth on page 3 of the specification. Accordingly, Applicants will attempt to obtain the corresponding English language Abstracts of the Japanese Patent Publications listed on page 3 of the specification.

Claim 5 was rejected under 35 USC §112, second paragraph, for the reasons set forth in paragraph 3, on page 2 of the Official Action. In particular, the Examiner objected to the phrase "the particle counter" as lacking antecedent basis. In order to address this ground of rejection, the phrase "the particle counter" has been revised as --a particle counter--. Accordingly, withdrawal of this ground of rejection is respectfully requested.

Claims 1, 3, 6-11, 13-15, 17 and 19-30 were rejected under 35 U.S.C. §102(b) as allegedly being unpatentable over U.S. Patent No. 5,904,778 ("Lu"). The reasons for the rejection are set forth in numbered paragraph 5, on pages 3-4 of the Official Action. This ground of rejection is respectfully traversed for the following reasons.

Claim 1 recites a method of processing semiconductor substrates and reducing particle contamination during processing of the substrates, the method comprising steps of

(a) placing at least one substrate on a substrate holder in an interior space of a vacuum processing chamber, the processing chamber including at least one non-oxide ceramic part having a surface exposed to the interior space, the surface having been shaped and treated to reduce particles thereon by a high intensity plasma conditioning treatment, (b) processing the at least one substrate by supplying process gas to the processing chamber, and (c) removing the at least one substrate from the processing chamber. The combinations of features recited in Claim 1 and in the claims dependent thereon are not disclosed or suggested by Lu.

Claim 15 sets forth a method of plasma conditioning a shaped surface of a ceramic part of a semiconductor processing chamber, the method comprising treating the shaped surface to reduce particles thereon by contacting the shaped surface with a high intensity plasma. The combinations of features recited in Claim 15 and in the claims dependent thereon are not disclosed or suggested by Lu.

In the rejection, it is alleged that Lu discloses a method which includes "placing at least one substrate on a substrate holder in an interior space of a vacuum space of a vacuum processing chamber, the processing chamber including at least one non-oxide ceramic part having a surface exposed to the interior space, the surface having been shaped and treated to reduce particles thereon by a high intensity plasma conditioned treatment . . . " (Official Action at page 3). However, no such teaching can be found in Lu. That is, Lu discloses that a surface film of CVD SiC produces fewer particles in a plasma etch reactor than

sintered SiC (column 7, lines 56-57 of Lu) and also mentions that the crystalline nature of CVD SiC causes it to be more uniformly etched with the etched particles being of atomic or molecular sizes (column 8, lines 2-4 of Lu) but there is no disclosure in Lu of any conditioning treatment of such CVD SiC. In fact, Lu is silent regarding any surface treatment of parts having such a CVD SiC surface film. As such, Lu fails to disclose or suggest the methods recited in Claims 1 and 15.

Claims 2, 4, 5, 12, 16 and 18 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Lu in view of U.S. Patent No. 5,863,376 ("Wicker"). The reasons for the rejection are set forth in numbered paragraph 7, on pages 4-6 of the Official Action. This rejection is respectfully traversed for the following reasons.

In the rejection, it is acknowledged that Lu fails to teach conditioning the exposed surface of the ceramic part to lower particle counts measured by a particle counter to below 20 particles as set forth in Claim 5. The Official Action alleges, however, that it would have been obvious "to employ any of a variety of processing steps and variables such as those claimed by the Applicant" allegedly because "[t]hey are well known in the etching art and known to affect both the rate and quality of the polishing process" (Official Action at page 5). However, Lu fails to provide any disclosure or suggestion of "polishing" or otherwise conditioning the surfaces of the silicon carbide parts disclosed therein. In fact, in view of Lu's teaching that the crystalline nature of CVD SiC causes it to be more uniformly etched with the etched particles being of atomic or molecular sizes (column 8, lines 2-4),

Lu actually leads away from the claimed method implying that a surface treatment of CVD SiC is not necessary. That is, Lu implies that the typical etching processes carried out in the plasma reactor will etch CVD SiC in such a manner that any particles formed during the etching will not cause problems during processing of substrates.

According to the invention, shaped parts are treated to minimize particle contamination of semiconductor substrates processed in the chamber (specification at page 6, lines 21-25). That is, such parts made by sintering or CVD followed by machining include shaped surfaces which can be the source of particle contamination (specification at page 7, lines 1-4). According to the invention, in order to condition such parts to minimize particle generation during semiconductor processing, the exposed surfaces of the parts are treated to incorporate or remove particles from the exposed surface (specification at page 7, lines 4-7). In a preferred embodiment, the surface layer is oxidized and the oxide layer is optionally removed in a manner which reduces the number of attached particles (specification at page 7, lines 7-9). No such conditioning treatment is disclosed or suggested in Lu. Further, Wicker fails to cure the deficiencies of Lu. As such, it is submitted that the claimed method is clearly patentable over the combination of Lu and Wicker.

It is submitted that the differences between the claimed subject matter and the prior art are such that the claimed subject matter, as a whole, would not have been obvious at the time the invention was made to a person having ordinary skill in the art.

In view of the foregoing, it is submitted that the present application is in condition
for allowance and such action is earnestly solicited.

Respectfully submitted,

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Date: December 18, 2001



Attachment to AMENDMENT

Marked-up Claim 5

5. (Amended) The method according to Claim 1, wherein the processing chamber comprises a single wafer plasma reactor, the method further comprising a step of conditioning the exposed surface of the ceramic part by sequentially treating no more than 50 wafers in the processing chamber while exposing the ceramic part to ion bombardment, the conditioning step being effective to lower particle counts measured by [the] a particle counter to below 20 particles.

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